

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In Re Application of	)	FOR: SYSTEM AND METHOD FOR
	)	PREDICTION OF BEHAVIOR OF
Amos Yahil, et al.	)	COMPLEX SYSTEMS
	)	
Serial No.: 09/404,122	)	
	)	Group Art Unit: 2123
Filed: September 23, 1999	)	

**DECLARATION OF ROBERT K. PIÑA**

I, Robert K. Piña, state that:

1. I am over the age of eighteen and competent to make this declaration.
2. I received a Doctor of Philosophy in Physics from the University of California, San Diego (UCSD) in 1994. As a graduate student at the Center for Astrophysics and Space Sciences at UCSD, I worked with Dr. Richard Puetter, a research physicist, analyzing mid-Infrared astronomical images. In early 1993, Dr. Puetter and I conceived and developed a method for reducing noise from an image signal using a technique we named the "Pixon method". Our work was directed exclusively to reconstruction of astronomical images. A patent application covering the Pixon method was filed in May 1993, with Patent No. 5,912,993 ultimately issuing in 1999. Over the period of 1993 to 1995, Dr. Puetter and I co-authored a number of manuscripts and conference presentations describing the Pixon method and its application to astronomical image reconstruction. Attached hereto as Exhibit A is a representative listing of publications which I have co-authored. Items number 12, 14, 28-30, 34, 64-69, 71 and 74 on the list all relate to the Pixon method.
3. After receiving my degree in 1994, I took a position as a professor of astronomy at University of Florida (Gainesville), where I conducted research using primarily mid-infrared telescopes to search for and study black holes, stars and star systems in space. Based upon my work, I have co-authored a number of manuscripts which were published in astronomy and astrophysics journals. Representative publications are listed in Exhibit A. As indicated by the titles of these publications,

my research work has been focused in the field of astronomy, studying stars and star-forming. I did not apply the Pixon method in my research nor did I conduct any further development work on the Pixon method or any similar image reconstruction method after I left UCSD.

4. I continued teaching and conducting research at the University of Florida until 2002, when I returned to San Diego to join Photon Research Associates, Inc. ("PRA"), a company which conducts research and development in the areas of remote sensing, missile defense, surveillance/reconnaissance, intelligence data analysis, and stealth system design for both government and commercial markets. In my current position, while I am involved the development of imaging applications, I do not employ the Pixon method.
5. I have reviewed and understand the specification, drawings and pending claims of the application covering the Algebron method. Copies of the application and pending claims which I reviewed are attached as Exhibits B and C, respectively. The Algebron method bears certain similarities to the Pixon method to the extent that both seek minimum complexity and use goodness-of-fit as the criteria for acceptance. However, there is a very significant difference arising from the type of data that is being analyzed which requires a different analytical process. With the Pixon method, the signal to be processed resides in an array of pixels (or other detector) which allows a geometric grid to be defined. This grid is then used to create the Pixon map which determines which Pixon kernel will operate on the image data at a specific location in the grid. The Pixon, or kernel, map is the key to the Pixon method.

The Algebron method does not include steps for creating a map because the input data has no external reference structure such as a grid or a signal that is capable of being segmented to allow kernels to be created. Instead, the Algebron method estimates the input data in terms of an independent set of variables that are completely unrelated to the input data except for the value of the variable for a given data point. The complete absence of a map for placement of the data within a structure makes the two methods very different.

6. During the period of time in which I was working on the Pixon method in 1993-95, I had not contemplated an application of the Pixon method to prediction in a system of independent, multiple co-varying abstract variables where there was no reference structure such as a grid based on the input data structure. I had no knowledge of the Algebron method until it was briefly described to me by Dr. Puetter in or around late 2000.
7. For the reasons explained in paragraphs 3 through 6 above, I believe that the Algebron and Pixon methods are distinct and further do not believe that I am a co-inventor of the Algebron method which is the subject of the patent application.
8. I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct to the best of my information and belief.

Dated: 8/22, 2003

Robert K. Piña  
Robert K. Piña